Section 990

METHOD OF TEST FOR HAMBURG WHEEL-TRACK TESTING OF COMPACTED HOT-MIX ASPHALT (HMA)

990.01 Scope

This procedure identifies UDOT modifications to AASHTO T 324, Hamburg Wheel-Track Testing of Compacted Hot-Mix Asphalt (HMA).

References:

AASHTO R 30, Standard Practice for Mixture Conditioning of Hot-Mix Asphalt (HMA)

AASHTO T 209, Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures

AASHTO T 275, Bulk Specific Gravity of Compacted Bituminous Mixtures Using Paraffin-Coated Specimens

AASHTO T 324, Hamburg Wheel-Track Testing of Compacted Hot-Mix Asphalt (HMA)

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990.02 Apparatus

See AASHTO T 324, Hamburg Wheel-Track Testing of Compacted Hot-Mix Asphalt (HMA)

990.03 SPECIMEN PREPARATION

990.03.01 Number of Test specimens – Prepare two test specimens for each test. Specimens shall be either laboratory prepared slab specimens or Field Compacted Core specimens.

990.03.02 Laboratory Produced HMA: Mix HMA according to Materials Manual of Instruction Part 8-988 and age according to AASHTO R 30, compact immediately.

990.03.03 Field Produced HMA Loose Mix: Obtain according to Materials Manual of Instruction Part 8-984 and reduce to test samples size according to Part 8-985.

990.03.04 Compacting Slab Specimens – All Laboratory compacted specimens shall be slab specimens and compacted using a Linear Kneading Compactor Slab specimens thickness will be at least twice the nominal maximum aggregate size. For Superpave HMA mixes of ½" and ¾" the standard thickness will be $1^5/_8$" (40mm). For Superpave HMA mixes between ¾" and 1½" the standard thickness will be $3^1/_8$" (80mm). Compaction temperature range will be obtained from the engineer.

Note 1: If cooking spray is used as a release agent during the compaction process, use a thin coating and wipe off excess.

990.03.04.01 Determine the mass of mixed HMA necessary to achieve a slab with 7 ±1% air voids (93% of G_{mm}), when compacted, using the formula below.

Calculate:

Mass of mixed HMA (g) = Volume of Molded Slab X 0.93 X G_{mm}

Where:

Volume of the Molded Slab = the calibrated volume of the molded slab determined as per 990.06.

G_{mm} = Theoretical Maximum Specific Gravity obtained on a companion sample, determined by AASHTO T 209

990.03.04.02 Heat top and bottom plates to compaction temperature. Transfer the mixed HMA to the mold in a manner that minimizes segregation and temperature differential. The temperature of the mixed HMA will be in the compaction temperature range during compaction.

Note 2: Suggested compaction considerations: Place the sample in a round bottom chute. Distribute the specimen in the mold with the chute so as to minimize segregation caused by moving the material from its initial position. Smooth the material into an even thickness using a flat, stiff spatula. For coarse mixes, enhance the seal at the edges by inserting the spatula once between the mold and the mix using a stabbing motion all around the mold. Load the upper plates into the mold beginning at each end and moving inward in both directions. The time from removing the sample from the oven to the time the compactor wheel drops and begins compaction should not exceed 5 ±1 minutes. If two slabs cannot be loaded in this time, build them one at a time. Continue compaction until the roller rides on top of the mold providing the calculated volume.

990.03.04.03 Cool the slab in the mold until it can be handled without damage.

990.03.04.04 Determine mass of the cooled slab; verify that the mass of the compacted slab is within 0.1% of mass determined in 990.03.04.01.

990.03.05 Field Compacted Core specimens must be 12” diameter or some other slab that provides 12” of unbroken length in the direction of the traffic and providing a width greater than 3” on each side of the traffic axis centerline. Mark the sample showing the direction of traffic.

990.04 PROCEDURE

990.04.01 Use Plaster-of Paris to rigidly mount the specimens in the mounting trays, compacted side up. Center and square the sample in the mounting tray so the plaster margin surrounding the sample is of equal size. Pour the plaster to a height equal to that of the tray so that the air space between the specimen and the tray is filled. The plaster layer underneath the specimen shall not exceed 0.08 in. Allow plaster to set; at least one hour.

990.04.02 The test temperature shall be 50°C. Condition specimens for 30 min after achieving test temperature. At no time should specimens be submerged longer than 35 min. prior to test initiation.

990.04.03 Lower wheel onto specimens.

990.04.04 Set the wheel-tracker to shut off after 20,000 passes or when the maximum LVDT displacement is 20 mm.

990.04.05 Perform the Hamburg Wheel-Track Testing as per equipment manufacturer’s instructions. For step-by-step instructions using the PMW Hamburg Wheel-Tracker see 8-990 Appendix.

990.05 MEASUREMENTS

Maximum impression (rut depth) is the maximum measured deformation in any location along the wheel-track. If the rut depths on the two laboratory compacted slabs vary by more than 6 mm and the resulting test produces a calculated failure, the test is to be deemed invalid and must be rerun.

990.06 CALIBRATED VOLUME OF THE MOLDED SLAB SPECIMEN

The calibrated volume of the molded slab will be determined annually or whenever deemed necessary.

Determine the calibrated volume of the molded slab:

Compact two slabs as above, measure the bulk specific gravity (G_{sb}) and volume of the slabs as per AASHTO T 275, Bulk Specific Gravity of Compacted Bituminous Mixtures Using Paraffin-Coated Specimens. Using the average mass and average G_{sb} calculate the calibrated volume of the molded specimen.

Calibrated volume of molded slab = mass of slab / G_{sb}

990.A Appendix Starting and Stopping the PMW–Wheeltracker

Read manufacturer's instruction manual. The following is courtesy of "PMW-Wheeltracker."

Starting a Test

1. Verify LVDT functionality
2. Run test setup
3. Set the temperature setpoint
4. Set the wheel speed setpoint
5. Check all the information of the Run Screen
6. If the operator would like to have a start confirmation prompt before the test begins
   - *Click* "Tools | Test Start Confirmation"
   - To remove confirmation *Click* "Test Start Confirmation" again removing the check mark
7. *Click* "Auto"
8. *Click* "Start"
9. A screen will popup stating "Fill Sequence Started"
10. Once the tank has been filled with water, the screen stating "Obtaining Temperature Setpoint" will appear
11. Once the temperature setpoint has been reached, a screen stating "Start Delay Initiated" will appear
12. Once the start delay has finished, a beeping alarm will sound for 10 seconds, indicating the test is about to start
    - If "Test Start Confirmation" has been selected the alarm will continue beeping until the operator *Clicks* "Ok" on the "Start Confirmation" prompt screen
13. The test will now start running.
14. At any time after this point, you may view the Run Time Graph until the test is finished.
15. Once the test is finished all of the test data will be saved to the database
    - The test will finish when one of the following is achieved:
    1. The test reaches the maximum number of passes
    2. Two Wheel only - Both samples reach the Maximum Impression Depth ()
       - If one sample reaches the maximum impression depth then the wheel will raise up, and the second sample will continue
    3. One Wheel only – The sample reaches the Maximum Impression Depth
16. A prompt will appear stating "Test has Completed Successfully"

Stopping a Test

1. *Click* "Stop"
2. *Click* "Yes" if you would like to save the data up to this point
3. *Click* "No" if you so not want to save the data up to this point
4. *Click* "Cancel" to resume the test

Pausing a Test

1. *Click* "Pause" to pause the test
2. To resume *Click* "Pause" again